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Correspondence to:

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5th April 2011

Commissioner – The Hon. Justice Catherine Holmes
Queensland Floods Commission of Inquiry
PO Box 1738
Brisbane 4000

Commissioner,

This is a short addendum to my submission which may be of some small assistance to your Inquiry.

As you are aware I am concerned about the wide variations between the pre-development flows and the recorded volumes of the major floods.

The pre-development flows are used to calculate the 66% requirement to reach the Brisbane River mouth for the Ecology. The IQQM computer modeling has the force of Law. For reference it is on page 91 of the Water Resource (Moreton) Plan 2007.

Since lodgment of my submission, Seqwater has released its 1100 page report on the operations of the Dams of the Wivenhoe/Somerset during the 2011 flood. The Joint Flood Task Force for the Brisbane City Council has also reported. That JFTF was chaired by Professor Colin Apelt.

The other most useful tool in arriving at solid conclusions is the Bureau of Meteorology website that now maintains daily rainfall figures for all rainfall stations since their introduction. They included the flood month of January 2011.

The principal feature of interest in Flood and Drought Proofing Brisbane is the volumes of these floods.

It must be pointed out that the flood volumes listed by these organizations are relatively easy to retain in full using the method outlined in my submission. My concern is that they may be below actual volumes.

The volumes they specify are:

- 2011 2,650,000ML. My calculations agree using the same method as the JFTF.
- 1974 1,410,000ML The pre-development flows records 4,300,000ML for the 1974 year. The balance of 2,890,000ML to be explained is a major variation. The annual average from the Wivenhoe/Somerset for 111 years is 951,971 ML.
- 1893 2,744,000ML. There were three floods in February 1893. Two majors with a minor in between. The second major concatenated with the minor and pushed the height within 0.28 metres of the first major. For convenience I call the majors 1893(1) and 1893(2).

On their basis for 1893(1) an approximation of the second February major flood would be 2,500,000ML. This totals 5,244,000ML for the month of February 1893. The pre-development flows for the year 1893 total 7,500,000ML. This variation of 2,256,000ML is partly accounted for with a further minor flood in June of that year. However the annual average from the Wivenhoe/Somerset for 111 years is 951,971 ML.

The 1974 flood volume requires special attention.

Seqwater discusses Rainfall and inflow on page 123 of section 8.

Second paragraph *"While the five day totals in January 1974 and January 2011 events are quite similar, the distribution of rainfall with time is quite different, and this had a major impact on the volume of runoff generated during each event."*

The information to examine the veracity of this statement is as follows:

1. Double the flow: Seqwater estimation requires us to accept that although the rainfall for 2011 and 1974 was quite similar, year 2011 produced almost double the inflow (190%, their figures). That seems most unlikely.
2. Demarcation of minor and major floods 2011: Seqwater has provided an excellent graph of the 2011 flood. My examination of it shows that the 2011 flood was similar in nature to the second major flood of 1893. The Bureau in their assessment of the 1974 flood clearly indicates that the preceding inflow in February 1893 was a minor flood. Daily rainfall statistics show that the major flood concatenated with the minor flood. It pushed the height to within 0.28 metres of the first major of February 1893. (Attached: 2011 the yellow markings are mine: 1893(1) flood graph constructed by me)

A similar situation arose in the 2011 flood. There was a clear demarcation of the rainfall from 6th to the 9th of January. It was a minor flood. The major flood was a three day event from the 10th to the 12th January.
3. Saturated catchments: Both the 1974 and 2011 flood had catchments saturated by prior rainfall. The catchment averages for 1974 were:
Wivenhoe Flood 25/28 307mm: Preceding flood in the month of January 190mm.
Somerset Flood 25/28 534mm: Preceding flood in the month of January 327mm.
(Attach 7)
4. Operational periods: Seqwater operational periods from 1 to 20 are listed by me. They cover the entire 2011 period. (Attach 1)
5. Rainfall stations: The rainfall recorded by these periods concurs with the average of the individual rainfall stations. The rainfall stations in operation for 1974 and 2011 were selected by me. Those few rainfall stations that did not qualify were examined for statistical aberrations. (Attach 2 & 3)
6. Intensity of rainfall: The relativity of the low rainfall period of the minor flood with the high rainfall period of the major flood reveals that the estimated inflows were consistent. The relativity was 3.28 for Wivenhoe in rainfall, 3.67 for Somerset in rainfall and 3.67 for estimated inflow. (See operational periods attach 1).
7. Inflow volume the same: This means that rainfall, on saturated catchments finds its way into the

dams irrespective of intensity. This would not be the case on dry catchments particularly in the Upper Brisbane River/Wivenhoe. (Attach 2 & 3)

8. Seqwater calculation of inflow Minor and Major floods: With Seqwater calculated inflow applicable to the minor flood at 560,000ML, there remains 2,090,000ML for the major flood of three days. (Attach 1)
9. Fair comparison of 1974 and 2011 major floods: Saturation has taken away the impact of high intensity rain so important on dry catchments. A fair comparison can now be made between 1974 and 2011 in the three day period of both floods. (Attach 2 & 3)
10. Comparison of catchment averages rainfall: Wivenhoe catchment average for 1974 was 307mm compared to the 2011 average of 273mm. Somerset catchment average for 1974 was 524mm compared to the 2011 average of 455mm (Attach 2 & 3)
11. Recalculation of 1974 flood: With catchment sizes in mind, it is observed that 14% more inflow occurred in 1974 making a total inflow of 2,382,000ML. (2,090,000ML(2011 major flood inflow) X 114% = 2,382,000ML 1974 inflow). (Attach 2 & 3)
12. Understatement of 1974 flood volume: On this basis, there is an understatement of approximately 1,000,000ML in the volume of the 1974 flood. (2,382,000ML – 1,410,000ML = 972,000ML).

Bremer River and Lockyer Creek

These two tributaries were examined principally to view the consistency of overall rainfall with the Wivenhoe/Somerset catchments. (Attach 5 & 6)

The overall rainfall from the Rainfall stations remained consistent with the rainfall stations in the Wivenhoe/Somerset. The 1974 rainfall for the period of the major flood was substantially higher in the Bremer River with a corresponding reduction in Lockyer Creek. (Attach 4)

The 1974 and 2011 volumes from both of these sources were consistent and calculated by me to be 1,530,000ML or 131% of the Wivenhoe. (Attach 4)

This means that a volume of water equivalent to 38% of the Wivenhoe must pass through the Brisbane River each day for 3 and one half days in 1974. With minor and major floods contributing, a little longer in 2011.

With the Wivenhoe/Somerset fully restrained, as we propose, they are allowed to run free.

Conclusion

There are substantial variations between the recorded flood volumes and the pre-development flows provided to me by DERM.

The sense of the above requires a review by Seqwater of the statement recorded above. While it was a short general observation it is an important qualification. The facts indicate otherwise. That statement is worth repeating:

Seqwater section 8 page 123 Second paragraph *"While the five day totals in January 1974 and January 2011 events are quite similar, the distribution of rainfall with time is quite different, and this had a major impact on the volume of runoff generated during each event."*

Your Inquiry could request the pre-development flows applicable directly to the floods of 1893(1), 1893(2) and 1974 from DERM. This would clear up most but not all misunderstandings. That the IQQM computer model defined in the Act on page 91 is a "daily time-step" model is without question. The Technical Advisory Panel "Moreton and Gold Coast WRP" notes also describes it as a "daily time step" computer model in its definitions on page 127. I am currently in dialogue with DERM by email attempting to obtain the flood volumes calculated by this IQQM computer model.

While I have not offered any comment on the handling of the operations of the dam, this may contribute to the understanding. The minor flood period 2011 was similar to the October and December 2010 overflows. As a consequence the operational periods 1 to 8 indicate to me that it was treated as another minor flow. At the demarcation point there was approximately 18% overflow still in the dam plus the inflow yet to arrive from the catchments. Those volumes together amounted to approximately 400,000ML.

The unexpected major flood gave no respite with the concatenation. They were dealing with a major flood and the residue of a minor flood.

You would be aware from my submission that the inclusion of major floods in the "once only base calculation" of the "mean annual flow" has produced mathematics that have increased the annual volume allocated to the Ecology from the intended 66% by the Technical Advisory Panel (TAP) to 78%. The over allocated volume is 160,000ML. This bears no relationship to the major flood volumes of 1890, 1893(1), 1893(2) and 1974 as the major floods should not have been included in the calculation in the first place. They were included in the calculation against the advice of the TAP.

Any variation from these pre-development flows will alter the Water Resource (Moreton) Plan 2007 Act and its associated Act that ensures that its requirements are met. As you are aware from my submission, that Act has been the basis used to reject the storage of water from the Wivenhoe/Somerset system in the expanded Borumba Dam for later return.

I wish you well in your deliberations

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John Vincent Hodgkinson F.C.A. (retired)

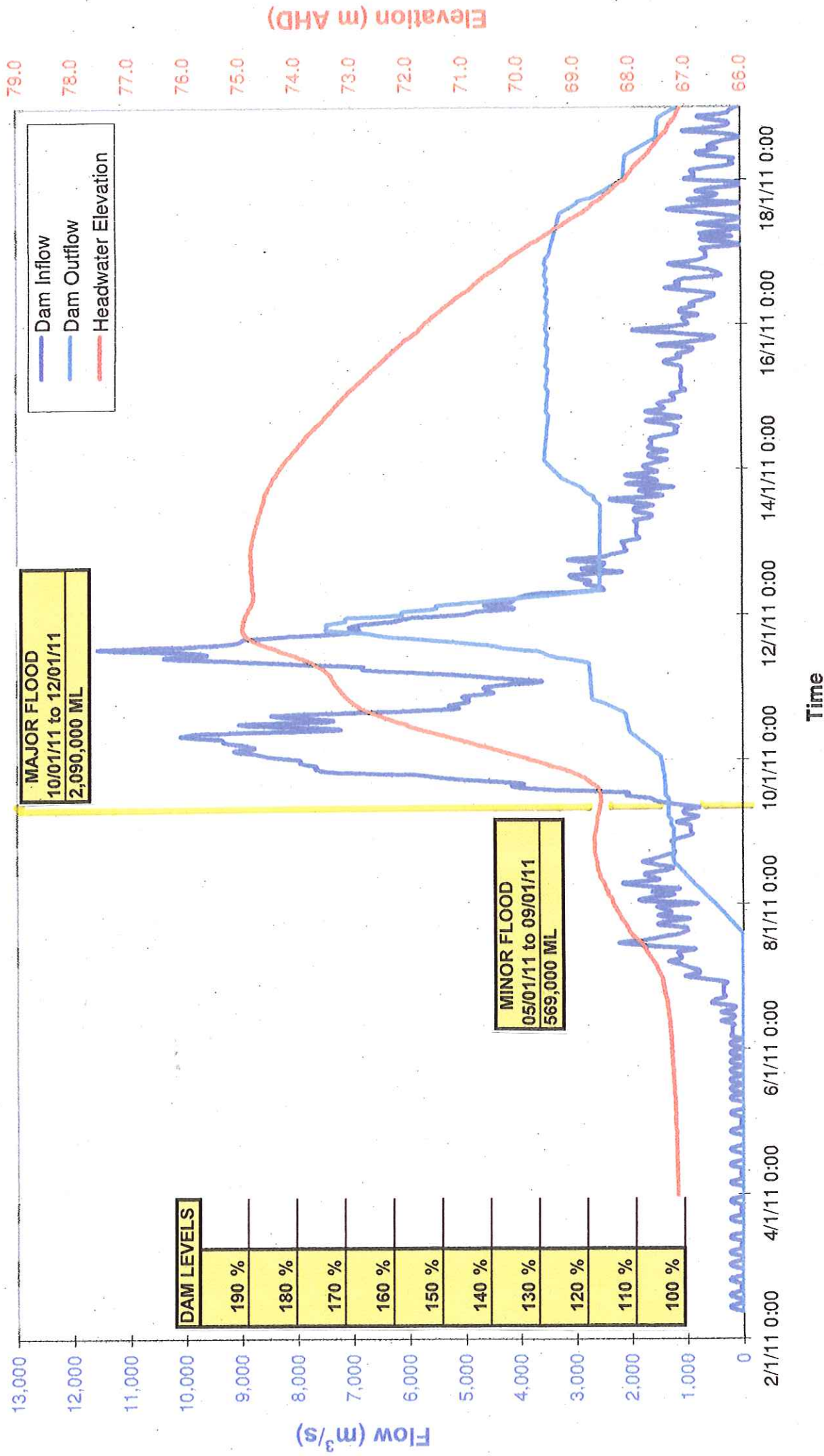
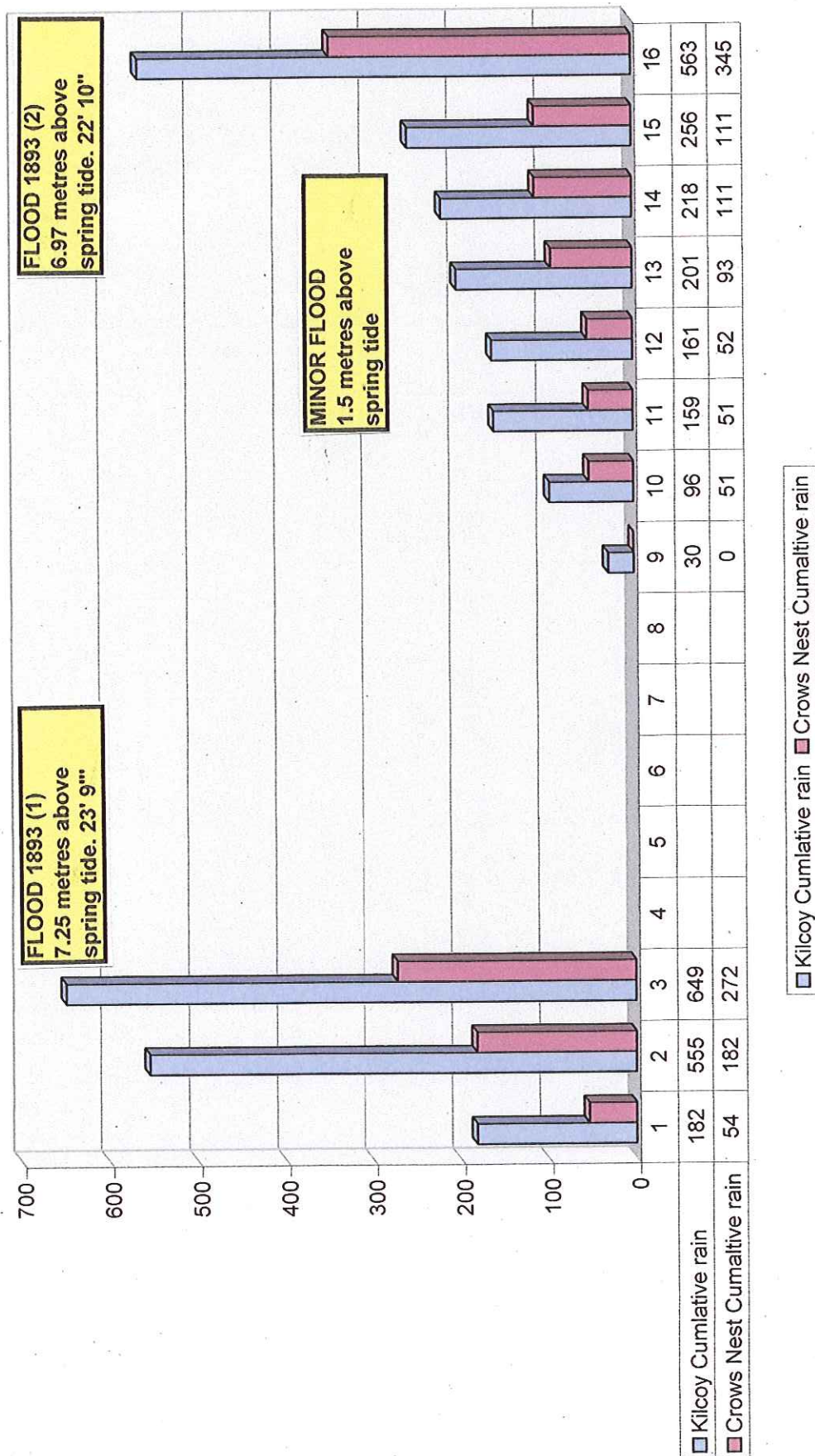


Figure 9.1.2 – Wivenhoe Dam inflow and release summary for the January 2011 Flood E

1893 floods. 1893(1) major (1-3); 1893 minor (9-15); 1893(2) major using minor flood as base to build height. Based on Kilcoy(Somerset) and Crows Nest (Wivenhoe) catchments. Pattern is indicative of others.



COMPARISON MINOR and MAJOR FLOODS - JANUARY 2011
Attach 1

Using Seqwater operational periods						RAINFALL				Estimated Inflow Ex Forecast
2011 Jan Day	SEQW Period	Day Jan	Start	Finish	Hours	Wiv Dam MM Cumulative	Som Dam MM Cumulative	Catchment Wivenhoe Period	Somerset Somerset Period	
						25	21	25	23	Pre-Flood
Minor Flood										
Thus	1	6	7.42							
Fri		7		2.00	19.00	53	44	28	23	204,000
	2	7	2.00	9.00	7.00	64	60	11	16	242,000
	3	7	9.00	15.00	6.00	89	90	25	30	346,000
	4	7	15.00							
Sat		8		14.00	23.00	92	95	3	5	420,000
	5		14.00							
Sun		9		1.00	11.00	100	111	8	16	457,000
	6		1.00	8.00	7.00	112	146	12	35	569,000
Minor Flood totals					73.00			87	125	569,000
Major flood concatenates (piggy-backs) with Minor Flood										
Sun	7	9	8.00	14.00	6.00	146	199	34	53	804,000
	8	9	14.00	19.00	5.00	208	305	62	106	1,272,000
	9	9	19.00							
Mon		10		1.00	6.00	232	343	24	38	1,468,000
						Rainfall Sunday		120	197	
	10	10	1.00	9.00	8.00	244	373	12	30	1,531,000
	11	10	9.00	15.00	6.00	274	407	30	34	1,708,000
	12	10	15.00	20.00	5.00	279	415	5	8	1,731,000
						Rainfall Monday		47	72	
Tues	13	10	20.00							
		11		4.00	8.00	323	437	44	22	2,016,000
	14		4.00	8.00	4.00	356	483	33	46	2,210,000
	15	11	8.00	13.00	5.00	382	570	26	87	2,506,000
	16	11	13.00	19.00	6.00	397	610	15	35	2,659,000
						Rainfall Tuesday		118	190	
						59.00		285	459	2,090,000
Major Flood						73.00		87	125	569,000
Minor Flood										

Percentages of major flood to minor flood
3.28
3.67
3.67
WINDUP OF FLOOD

Tues	17	11	19.00			398	610	1	0	2,659,000
				21.00						
Wed	18	11	21.00			399	613	1	3	2,650,000
		12		8.00						
Thus	19	12	8.00			401	619	2	6	
		13		12.00						
Fri	20	14	12.00			415	626	14	7	
		20		12.00						

WIVENHOE - UPPER BRISBANE RIVER CATCHMENT
Attach 2
All rainfall Stations in operation in 1974 and 2011

20-11-74		19-74		Month of January		Crow's Nest no 40382		Glen Haven no 40381		Esk no 40075		Toogoolawah no 40285		Vincent Vale no 40307		Danewood V no 40635	
Days in month						2011	1974	2011	1974	2011	1974	2011	1974	2011	1974	2011	1974
5						0		0		0		0		6		0	
6						53		51		45		18		34		55	
7						19		21		28		31		27		32	
8						26		11		27		25		17		70	
9						14		8		5		14		0		81	
						112		91		105		88		78		238	
10	25	147	32	129	24	131	78	182	44	81	17	225	84				
11	26	162	50	150	54	150	88	107	83	47	20	40	26				
12	27	27	142	13	137	39	218	27		2	177	50	126				
	28		47		23		64		282		25		46				
		336	271	292	238	320	448	316	409	130	239	315	282				

20-11-74		19-74		Linville no 40387		Blackbutt no 40020		Perseverance no 40480		Yarraman no 40259		Mt Brisbane no 40140		TOTALS		TOTALS	
		2011	1974	2011	1974	2011	1974	2011	1974	2011	1974	2011	1974	2011	2011 Average	1974	1974 Average
6		25		39		29		34		68		451	41				
7		39		54		27		30		25		333	30				
8		36		40		22		17		42		333	30				
9		51		31		11		17		16		248	23				
		151		164		89		98		151		1365	124				
10	25	158	51	149	68	136	48	103	28	61	98	1502	137	572	52		
11	26	64	95	110	107	150	47	108	81	101	61	1189	108	712	65		
12	27	33	114	15	113	25	142	3	123	81	137	315	29	1429	130		
	28		34		40		45		32		28	0	0	666	61		
		255	294	274	328	311	282	214	264	243	324	3006	273	3379	307		

SOMERSET - STANLEY RIVER CATCHMENT

All rainfall Stations in operation in 1974 and 2011

Attach 3

11 74 Month of January												TOTALS		TOTALS	
Days in month	Kilcoy no 40110		Mt Mee no 40145		Sim Jue Creek no 40188		Peachester no 40169		Somerset Dam no 40189			2011	2011 Average	1974	1974 Average
	2011	1974	2011	1974	2011	1974	2011	1974	2011	1974					
5	0		0		0		1		30			31	6		
6	13		13		9		5		24			64	13		
7	31				23		45		55			154	31		
8	0		123		22		32		30			207	41		
9	70		64		9		124		0			267	53		
	114		200		63		207		109			723	145		
10 25	0	61	189	331	132	133	298	250	192	68		811	162	843	169
11 26	0	47	185	167	142	102	108	52	156	11		591	118	379	76
12 27	403	108	176	341	18	162	211	265	66	186		874	175	1062	212
28		34		122		50		95		37		0	0	338	68
	403	250	550	961	292	447	617	662	414	302		2276	455	2622	524

This is an exercise to calculate the relativity of the Wivenhoe/Somerset inflows with the Bremer River/ Lockyer Creek inflows

COMPARISON OF RAINFALL VOLUMES Wivenhoe/Somerset V Bremer River/Lockyer Creek

Volumes do not necessarily convert to inflow. However in both floods, the catchments were saturated. For example, the 2011 flood in the Wivenhoe/Somerset has been accurately calculated at 2,650,000ML compared to the calculated volume below at **3,106,738ML**. This represents a fill of 85% of rainfall and gives credence to these comparisons.

the rainfall volume for the Bremer River and Lockyer Creek have remained constant for the 1974 and 2011 floods. With a 15% loss it represents 1,530,000ML flow from these two tributaries or 131% of the capacity of the Wivenhoe Dam.

Over a three and one half day period we must cope with a volume of 38% in Wivenhoe Dam capacity terms to avoid flooding in a 1974 type flood. The 2011 flood was elongated through a minor and major flood and therefore reduced flow below 38% a day for three and one half days

Catchment	Catchment Area Sq Kms	Average Rainfall See calcs 1974	Volume of rainfall over catchment 1974	Average Rainfall See calcs 2011 Major	Average Rainfall See calcs 2011 Minor	Volume of rainfall over catchment		
						2011 Major	2011 Minor	2011 Total
Wivenhoe	5,554	307	1,705,078	273	124	1516242	688696	2204938
Somerset	1,503	524	787,572	455	145	683865	217935	901800
	7,057		2,492,650			2200107	906631	3106738
Bremer	2,032	457	928,624	290	85	589280	172720	762000
Lockyer	2,890	335	968,150	282	89	814980	257210	1072190
	4,922		1,896,774			1404260	429930	1834190
			76.1			63.8	47.4	59.0
Mid Brisbane	552							
Lower Brisbane	1,195							
Oxley Creek	258							
	2,005							
Total	13,984							

LOCKYER CREEK catchment
Attach 5
All rainfall Stations in operation in 1974 and 2011

20-11 Days in month	19-74	Month of January				Forest Hill		Gatton		Mt Berryman		Mt Whitesto	
		Lowood 40120		Coominya 40056		40079				No 40310		No 40397	
		2011	1974	2011	1974	2011	1974	2011	1974	2011	1974	2011	1974
5		0		0		0		0		46		0	
6		13		26		11		22		19		22	
7		32		49		41		31		25		65	
8		13		24		22		23		11		14	
9		6		4		3		9		4		2	
		64		103		77		85		59		103	
10	25	102	53	99	44	63	50	67	26	53	83	49	16
11	26	180	105	101	106	84	115	77	70	98	178	67	51
12	27	203	194	161	194	75	238	108	179	67	216	85	139
	28	0	33	0	47	0	0	0	43	0	86	0	40
		485	385	361	391	222	403	252	318	218	563	201	246

20-11 Days in month	19-74	Upper Tent No 40388		Hattonvale No 40095		Helidon PO No 40096						TOTALS		TOTALS	
		2011	1974	2011	1974	2011	1974	2011	1974	2011	1974	2011	2011 Average	1974	1974 Average
6		20		39		57		0		0		229	25		
7		46		35		34		0		0		358	40		
8		28		16		25		0		0		176	20		
9		1		7		6		0		0		42	5		
		95		97		122		0		0		805	89		
10	25	60	21	66	54	94	30	0	0	0	0	653	73	377	42
11	26	73	57	0	108	0	70	0	0	0	0	680	76	860	96
12	27	63	122	277	0	162	127	0	0	0	0	1201	133	1409	157
	28	0	34	0	42	0	40	0	0	0	0	0	0	365	41
		196	234	343	204	256	267	0	0	0	0	2534	282	3011	335

Bremer River/Warrill creek catchment
All rainfall Stations in operation in 1974 and 2011

Attach 6

11 74 Month of January												TOTALS		TOTALS	
Days in month	Tarome		Franklyn Vale		Rosevale		Grandchester		Morang		2011	2011 Average	1974	1974 Average	
	No 40196		No 40374		No 40183		No 40091		No 40400						
	2011	1974	2011	1974	2011	1974	2011	1974	2011	1974					
5	0		2		2		0		0		4	1			
6	36		30		9		22		26		123	25			
7	62		34		52		28		48		224	45			
8	9		5		18		16		9		57	11			
9	2		0		6		3		6		17	3			
	109		69		85		69		89		425	85			
10	25	26	24	40	42	14	30	77	84	41	33	198	40	213	43
11	26	86	142	168	134	83	88	185	160	98	144	620	124	668	134
12	27	90	247	133	364	135	86	174	248	102	243	634	127	1188	238
	28		58	0	59	0	4	0	50	0	47	0	0	218	44
		202	471	341	599	232	208	436	542	241	467	1452	290	2287	457

1974 Rainfall in months													Attach 7
	January 25/28 Flood	January rain ex flood	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wivenhoe													
Linville	294	153	55	183	25	56	29	23	33	62	156	104	51
Perseverance Dam	282	245	27	129	28	63	31	14	40	47	51	165	87
Yarraman	264	159	9	44	25	42	17	14	42	63	57	115	86
Glen haven	238	164	6	94	31	56	30	22	28	57	49	150	103
Esk	448	185	74	114	54	59	32	39	9	55	53	152	74
Crows nest	271	255	18	117	27	67	31	23	40	57	75	181	71
Toogoolawah	409	180	20	122	48	39	36	17	33	71	59	124	73
Mt Brisbane	324	144	57	192	42	53	48	23	70	32	74	132	65
Danewood	282	230	85	203	42	85	31	10	32	67	80	124	85
Blackbutt	328	255	34	155	28	63	19	21	55	54	77	99	42
Vincent Vale	239	116	9	42	6	51	28	31	35	98	78	126	71
Total	3379	2086	394	1395	356	634	332	237	417	663	809	1472	808
Catchment average	307	190	36	127	32	58	30	22	38	60	74	134	73
Somerset													
Peachester	709	468	190	398	160	173	59	18	58	63	125	299	48
Mt Mee	961	612	249	430	98	98	56	7	82	51	88	216	52
Sim Jie Ck	447	222	41	286	54	53	70	30	42	61	56	125	75
Somerset Dam	302	168	63	157	64	50	46	17	69	67	88	158	59
Kilcoy	250	166	36	146	64	42	25	9	32	60	90	143	78
Total	2669	1636	579	1417	440	416	256	81	283	302	447	941	312
Catchment average	534	327	116	283	88	83	51	16	57	60	89	188	62